

CLUSIA FABIOLAE, A NEW SPECIES,
WITH A SYNOPSIS OF *CLUSIA* SECTION
ANANDROGYNE (CLUSIACEAE) IN GUAYANA

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ABSTRACT

In preparation of the treatment of *Clusia* section *Anandrogyne* for *Flora of the Venezuelan Guayana*, *Flora of the Guianas*, and *Flora of Central French Guiana*, the section is lectotypified and its description is emended. A key to the species, along with updated descriptions with citation of types and representative specimens examined, are also provided for each species, concomitant with discussions of distribution, ecology and conservation status. Discussions of postulated phylogenetic relationships are presented for each taxon. *Clusia fabiolae* is described and illustrated. *Clusia scariosa* is relegated to synonymy under *Clusia pachyphylla*. *Clusia duartei* is placed in the section for the first time, based on new data from flowering material, and *C. savannarum* is newly recorded for Venezuela. *Clusia sessilis* is a homonym and a *nomen novum*, *Clusia wurdackiana*, is provided for it.

RESUMEN

Al preparar un tratamiento taxonómico del género *Clusia* secc. *Anandrogyne* para las floras de la Guayana Venezolana, de las Guayanas, y de la Guayana Francesa Central, se lectotipifica la sección y se amplía su descripción. Además, se ofrece una clave para distinguir las especies, junto con descripciones actualizadas, tipos y especímenes citados. Se discute el parentesco, la distribución geográfica, ecología y estatus en cuanto a conservación para cada especie. Finalmente, se discute lo que sabe de la filogenia de dichas especies. Se describe, se ilustra y se discute el parentesco de *Clusia fabiolae*. Se relega *C. scariosa* a la sinonimia bajo *C. pachyphylla*. Se ubica *Clusia duartei* en la sección por la primera vez, en base a nuevo material en flor, y se cita *C. savannarum* como nuevo para Venezuela. *Clusia sessilis* es un homónimo y por lo tanto, se ofrece para ella un nombre nuevo, *Clusia wurdackiana*.

INTRODUCTION

In preparation for a forthcoming treatment of the genus *Clusia* for the Flora of the Venezuelan Guayana, Flora of the Guianas, and Flora of Central French Guiana, it became clear that a revision of section *Anandrogyne* was needed. Overall, the section consists of 69 species, of which 19 are as yet undescribed, and is defined by the largely anantherous staminodes of the pistillate flowers and the pluriseriate, acropetally longer stamens of the staminate flowers with anthers dehiscent by wide longitudinal slits. This section, the "*Clusia multiflora* Group" of Hammel (1986), is the largest and

most taxonomically complex of all infrageneric groups within the genus. While apomixis has not been proven for the group, several individuals of a *Clusia elliptica* H.B.K. population in northern Colombia have been seen with young fruit forming before the petals have completely opened, implying that apomixis may occur. As a result of the present study, seven species are now known from the Guayana Floristic Province (sensu Maguire 1979).

TAXONOMIC TREATMENT

Clusia section **Anandrogynae** Planchon & Triana, Ann. Sci. Nat. 2 sér 14:323. 1860. A. Engler, Nat. Pflanzenfam. 3(6):225. 1895. LECTOTYPE SPECIES (here designated): *Clusia multiflora* H. B. K., Nov. Gen. Sp. 5:200. 1822.

Clusia section *Criuva* Bentham & Hooker subsection *Anandrogynae* (Planchon & Triana) Engler in Martius, Fl. Bras. 12 (1):402. 1888.

Clusia subgenus *Thysanoclusia* Vesque section *Anandrogynae* (Planchon & Triana) Vesque, in A. DC. & DC. Monogr. Phan. 8:29. 1893.

Free-standing shrubs or trees; latex white. Leaves subsessile or petiolate; petioles canaliculate and/or marginate, usually with prominent adaxial margined pits basally. Staminate inflorescence a terminal cyme or panicle of cymes, subtended by foliaceous bracts, the bracts early caducous or rarely, persistent (*C. wurdackiana*); peduncle tetragonal; secondary inflorescence bracts 2, cartilaginous or coriaceous; floral bracts 2, cartilaginous; pedicels tetragonal or angulate; bracteoles 2–6, cartilaginous. Staminate flowers pink, yellow or white; sepals (4–)6–8(–10), cartilaginous, the outer opposite, the inner decussate or contorted; petals (4–)6–8(–10), carnose, coriaceous or membranaceous, the outer decussate, the inner decussate and/or contorted, sometimes progressively larger acropetally; stamens numerous, the androphore poorly developed, cubic or hemispherical, the filaments apically free, basally connate, linear, flattened, coriaceous, the anthers muticous, extrorsely or latrorsely dehiscent by wide longitudinal slits, the thecae linear or ovate; pistillode absent. Pistillate flowers as in staminate but staminodes 4–numerous, linear, anantherous or rarely with ovate antherodes (sterile anthers), producing mostly abortive pollen or sometimes wholly sterile, sometimes early caducous; pistil ovoid or subglobose; carpels (4–)5–10(–12); styles obsolete or equalling carpels in number; stigmas cuneiform or corniculoid. Fruit ovoid or subglobose, rarely urceolate, the stigmas and styles persistent.

Distribution.—Sixty-nine species, throughout the Neotropics, but with centers of diversity in the Andes of Colombia and Peru, principally in premontane and montane moist, wet or pluvial forests.

Clusia section *Anandrogynae* is one of the most difficult groups within the genus, not only because of the lack of adequate collections for many of the Andean taxa, but also because of the tendency for the staminodes to be

early caducous. Staminodia frequently begin to fall out from beneath the sepals once they become reflexed, even if the sutures of the capsule have not begun to open. When sterile or without staminodia, some members of section *Anandrogynae* are virtually indistinguishable from other species in sections *Polythecandra* or *Retinostemon*. In addition, many taxa are known only from mature fruit, and have been placed in the section because no staminodes are known. Likewise, for those taxa, we do not know if staminodes were "lost" or if they ever occurred, thus increasing the probability that the section is paraphyletic as currently defined.

Members of the group are usually locally common. My field experience has shown that they often occur in numbers exceeding 30 individuals/ha. Therefore, given their ecological importance in the *Clusia* scrub forests of many tepuis and the thickets of the Andean subpáramo life zone, a comprehensive systematic revision of the group throughout its entire geographic range is needed. The present treatment is designed to provide descriptions, specimen citations, and explain concepts thus far established in detail not possible for the aforementioned floristic treatments, until a more comprehensive monograph can be undertaken. Morphological terminology follows Pipoly and Graff (1995).

Clusia multiflora H. B. K. was chosen as the lectotype species instead of *Clusia ducu* Benth, the other taxon mentioned in the protologue, because *C. multiflora* more adequately fits the most narrow interpretation of the section *Anandrogynae* concept, with its large flowers, 4–5-merous calyx and 5–6-merous corolla, the prominent androphore, and 5 anantherous staminodia.

KEY TO GUAYANA SPECIES OF *CLUSIA* SECTION *ANANDROGYNE*

1. Branchlets 2–7(–8) mm diam., pedicels thin, 2.5–6.5 mm long; stigmas cuneiform.
2. Branchlets verrucose, decussately tetragonal, 2–3 mm diam., not semisucculent; leaf blades (2–)3.5 cm long, (1.5–)2.5–3.3 cm wide, the bases cordate; sepals 5 1. *C. fabiolae*
2. Branchlets smooth, simply tetragonal, or subtetragonal, (3.5–)5–7(–8) mm diam., semisucculent; leaf blades 5–9 cm long, (3.4–)5–8 cm wide, the bases truncate or broadly acute; sepals 4.
3. Petioles without conspicuous adaxial margined pits; leaf bases subacute; peduncle obsolete to 1 cm long; petals 5; staminodia numerous, early caducous. 2. *C. phelpisiae*
3. Petioles with large adaxial margined pits; leaf bases rounded to truncate; peduncle (1.2–)2.5–5 cm long; petals 4; staminodia 4–10, persistent in fruit.
4. Inflorescence 3–4 times compound, 9–12-flowered; antherodes producing small amounts of pollen; styles obsolete; fruit ovoid; at margins of scrub forests with small savannas, in open, rocky areas, 1,250–2,000 m, southern Amazonas, Venezuela 3. *C. rotundifolia*

4. Inflorescence simple, 1–3-flowered; antherodes without pollen; styles thin, 1–1.5 mm long; fruit subglobose; shrub islands in savannas, 460–1,000 m, eastern Bolívar, Venezuela and adjacent Guyana. 4. *C. savannarum*
1. Branchlets (8–)8.5–15(–22) mm diam.; pedicels thick, 7–15 mm long; stigmas corniculoid.
5. Leaf blades chartaceous to coriaceous, obovate to oblanceolate, the bases acute, the margins flat; sepals stiffly coriaceous, the margins entire; styles thick, radiate, 3–5 mm long at maturity; ovary and fruit smooth, not sulcate 5. *C. wurdackiana*
5. Leaf blades cartilaginous, elliptic to suborbicular, the bases obtuse to truncate; sepals chartaceous, the margin variously incised; styles obsolete; ovary and fruit deeply sulcate.
6. Branchlets 8–11 mm diam.; petioles 1–1.5(2) cm long; leaf blades with secondary veins prominently raised above and below; floral bracts 4, 0.8–1.2 cm long. 6. *C. pachyphylla*
6. Branchlets 15–22 mm diam.; petioles 2–3 cm long; leaf blades with secondary veins inconspicuous above and below; floral bracts 2, 1.5–3 cm long. 7. *C. duartei*

1. *Clusia fabiolae* Pipoly, sp. nov. (Fig. 1)

Ob ramulos angulatos, pedicelos usque ad 6.5 mm longos, laminas cartilagineas, inflorescentiam terminalem necnon stigmates cuneiformes *C. rotundifoliae* valde arcte affinis, sed ab ea ramulis tetragonis (non sulcatis) 2–3 (nec 5–8) mm diametris, lamina ad basem cordata (non rotundata vel truncata), secus marginem plana vel subrevoluta (nec manifeste revoluta), pedunculo obsoleto vel usque ad 1 (non 2.5–5) cm longo, denique fructu globoso (non ovoideo) statim separabilis.

Terrestrial, free-standing shrub or small tree to 4(–7) m tall. Branchlets decussately tetragonal, with a few subacute angles, 2–3 mm diam., verrucose, ultimately terete with age, glabrous. Leaves sessile; blades cartilaginous, ovate to oblong, (2–)3.5–4.5 mm long, (1.5–)2.5–3.3 mm wide, symmetric, apex obtuse, base cordate, adaxially nitid, abaxially dull, with conspicuous, black linear latex canals, the midrib prominently raised and the secondary veins not visible above and below, the margin translucent, thick, flat or rarely subrevolute when dried; petioles very small, 3–5 mm long, deeply canaliculate, verrucose when dried, the adaxial pits broadly margined. Staminate inflorescence a terminal panicle of 3-flowered cymes, 2–3 cm long and wide; peduncle tetragonal, obsolete to 1 cm long; secondary inflorescence bracts 2, opposite, coriaceous, oblate, 3–3.2 mm long, 4.2–4.3 mm wide, apex obtuse, carinate, medially crassate and somewhat verrucose, the margin scarious, ca. 0.3 mm wide, entire; pedicels tetragonal, like branchlets, 2.5–5.5(–6.5) mm long, glabrous; bracteoles 2, opposite, coriaceous, suborbicular, 5.4–5.6 mm long, 5.6–5.8 mm wide, apex rounded, medially crassate, carinate, verrucose, without latex canals, the margin undulate, incised, scarious, the margin ca. 0.2 mm wide. Flowers pink; sepals 5, the outer whorl 2, decussate to the bracteoles, subcoriaceous, oblate,

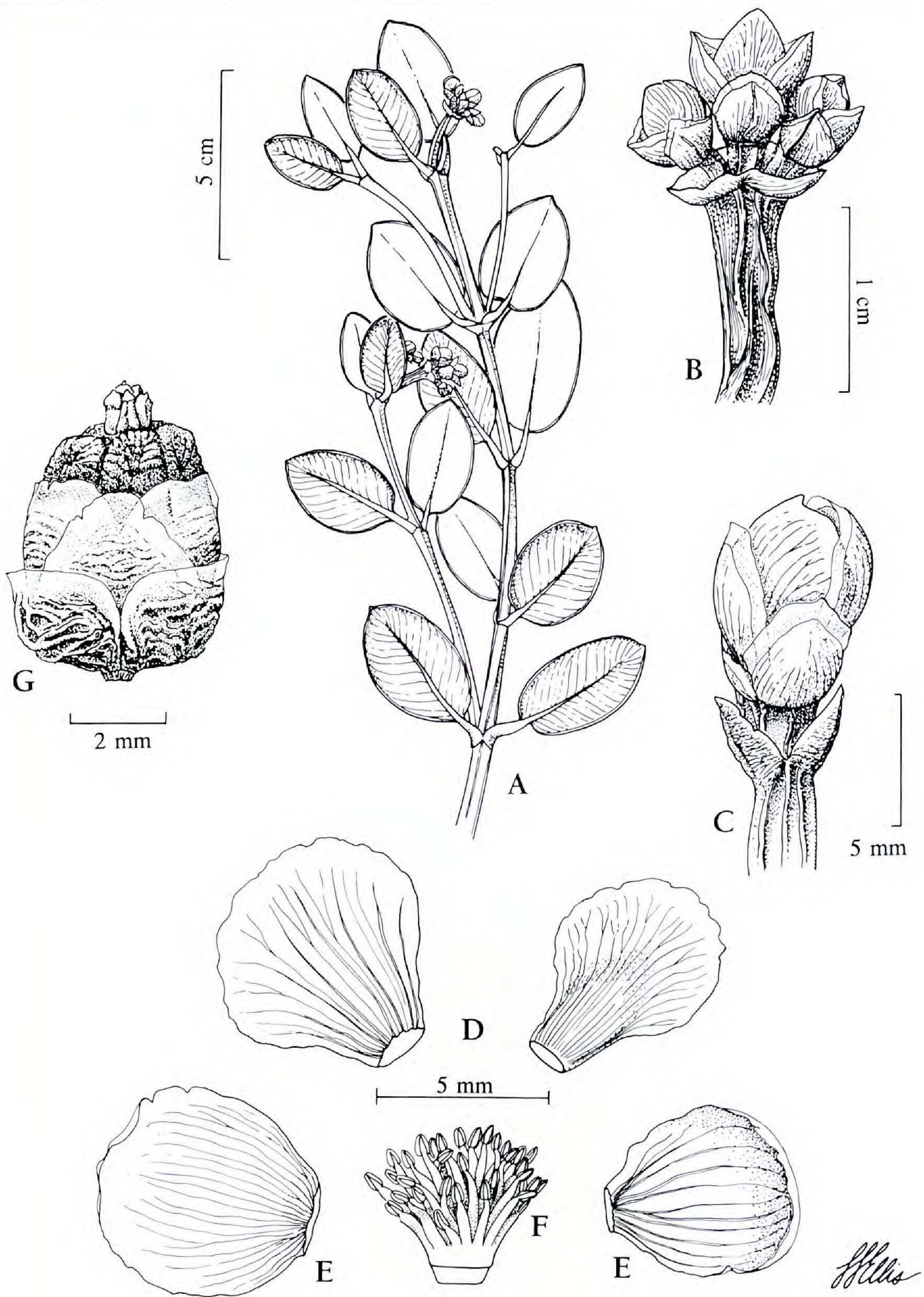


FIG. 1. *Clusia fabiolae* Pipoly. A. Habit. B. Cyme. C. Bracteoles and flower bud. D. Petals of staminate flower. E. Sepals. F. Androphore and androecium. G. Calyx and fruit. A-B, drawn from *Steiermark* 93190 (staminate); C-E, drawn from *Liesner* 21021 (staminate); F, drawn from *Steiermark* 128298 (pistillate).

5.9–6.1 mm long, 7–7.2 mm wide, apex rounded, carinate, verrucose, with brown latex canals conspicuous subapically, the margin subentire, hyaline, scarious, with a few incisions, glabrous, the inner whorl 3, contorted, chartaceous, suborbicular, 5.5–8 mm long, 6–8.5 mm wide, apex rounded, medially crassate, hyaline, with brown latex canals conspicuous everywhere but the margin, the margin subentire, hyaline, scarious, with a few incisions, glabrous; petals 4, contorted, membranaceous, spreading, abruptly obovate-spathulate, the proximal portion 2.1–2.2 mm long, 2.9–3 mm wide, the distal portion suborbicular, 6.6–6.7 mm long and wide, apex rounded, flat, the margin undulate, entire, glabrous; receptacle concave, without resin; stamens numerous, more than 60, the androphore hemispherical, 0.4–0.5 mm tall, 2.3–2.4 mm diam., the distal ca. 2–3 mm long, progressively longer acropetally to 5.5(–6) mm long, the filaments linear, flat, as wide as the anthers, 1–3 mm long, 0.3–0.5 mm wide, the anthers muticous, 0.7–0.8 mm long, 0.5–0.6 mm wide, apex emarginate, base cordate, dehiscent by broad longitudinal slits running entire length, the connective medially darkened on both sides; pistillode absent. Pistillate inflorescence as in staminate but secondary inflorescence bracts very widely ovate, 3.8–3.9 mm long, 4–5 mm wide, apex short-acuminate, medially crassate, carinate, rugose, the margin hyaline, entire, glabrous. Flowers; sepals 4, the outer pair decussate to the bracts, chartaceous, suborbicular, 6–6.2 mm long, 5.5–5.7 mm wide, asymmetric, hyaline, apex rounded, medially crassate, rugose, carinate, cucullate, latex canals inconspicuous, the margin hyaline, scarious, ca. 0.2 mm wide, with 1–2 incisions, glabrous, the inner pair decussate, chartaceous, widely ovate, 5.9–6.1 mm long, 5–5.2 mm wide, symmetric, hyaline, apex obtuse, medially crassate, rugose, carinate, cucullate, latex canals inconspicuous, the margin scarious, hyaline, ca. 0.1 mm wide, with 1 incision, glabrous; petals 4, contorted, thinly carnose, widely obovate, 6.4–6.6 mm long, 4.8–5 mm wide, apex rounded, medially rugose, flat, the margin somewhat translucent, flat, entire; staminodes 4, flat, linear, anantherous, 2.3–2.5 mm long, 0.8–1.1 mm wide, persistent in early fruit; pistil ovoid, 5.5–6 mm long, 4–4.5 mm diam.; carpels 5; styles erect, short, ca. 0.3–0.5 mm long, the stigmas sessile, cuneiform, 1.2–1.5 mm long, 0.9–1 mm wide, apex acute, base obtuse, attached toward base and apex. Fruit globose, 1–1.2 cm long, 0.9–1 cm diam.

TYPE: VENEZUELA. Bolívar: Dtto. Piar, Camarcaibarai-tepuí, summit; fourth of four tepuis from W to E in Aparamán range; 5°53'N, 61°59'W; highly eroded tepui summit with deep canyon S to 100 m; 26 Mar 1987 (pist. fl), *B. Holst* 3626 (HOLOTYPE: VEN; ISOTYPES: BRIT, E, MO, NY, US).

PARATYPES: VENEZUELA. Bolívar: Abacapá-tepuí, Macizo del Chimantá, 2,125–2,300 m, 13 Apr 1953 (F (2 shts), MO, NY, US, VEN); Amurí-tepuí, Macizo del Chimantá,

section W of Acopán-tepuí, 5°10'N, 62°07'W, 1,850 m, 2–5 Feb 1991 (pist. fl, precocious), *J. Steyermark et al.* 128555 (MO, VEN); Apacará-tepuí, E-C section, 21–22 June 1953 (pist. fl, fr), *J. Steyermark* 75935 (F-2 shts, NY, US, VEN); Apacará-tepuí, Macizo del Chimantá, S base, 5°20'N, 62°12'W, 2,200 m, 30 Jan–1 Feb 1983 (fr), *J. Steyermark* 128298 (MO, US, VEN); Auyán-tepuí, above Salto La Catira, C section, E of Río Churúm, 1,950 m, 27–28 Dec 1977 (fr), *C. Brewer-Carias s.n.* (MO, VEN); Auyán-tepuí, summit, 1,800 m, 5 Feb 1988 (fr), *F. Delascio & R. López* 13573 (MO, VEN); Auyán-tepuí, summit, SE, between “Boggy Camp” & “Oso Woods Camp”, 2,200 m, 1 May 1964 (stam. fl), *J. Steyermark* 93190 (F, NY, US, VEN); summit, C portion of NW branch, near Jimmy Angel airplane, 1,800 m, 7 May 1964 (stam. fl), *J. Steyermark* 93479 (F, NY, US, VEN); summit Auyán-tepuí, SE section, 5°42'N, 62°26'W, 2,140 m, 26 Feb 1978 (stam. fl), *J. Steyermark et al.* 116013 (F, MO, VEN). Dtto. Piar, Camarcaibarai-tepuí, E of Auyán-tepuí, 2,400–2,500 m, 25–26 Mar 1987 (pist. fl, fr), *F. Delascio* 13111 (MO, US, VEN); C & W part of saddle between Camarcaibarai-tepuí and Tereké-Yurén-tepuí, 1,800–1,900 m, 23 May 1986 (stam. fl), *R. Liesner & B. Holst* 21021 (COL, F, MO, US, VEN); summit of Tereké-Yurén, W edge, 5°52'N, 62°02'W, 2,135 m, 26 May 1986 (pist. fl), *R. Liesner et al.* 21066 (MO, US, VEN), (stam. fl), *Liesner et al.* 21070 (MO, US, VEN); Central section, Macizo del Chimantá, 1,940 m, 4 Feb 1955 (fr), *J. Steyermark & J. Wurdack* 414 (F, NY, VEN); Murey-(Euroda)-tepuí, NE sector of Macizo del Chimantá, 5°23'N, 62°03'W, 2,550 m, 1–3 Apr 1989 (stam. fl), *J. Pruski & O. Huber* 3588 (NY, VEN). Ptari-tepuí, summit, 5°45'N, 61°45'W, N of Sta. Teresita de Kavanayén, 2,360–2,420 m, *J. Steyermark et al.* 115697 (MO, US, VEN).

Distribution.—Endemic to the tepuis of the southeastern portion of Bolívar state, Venezuela, at 1,600–2,500 m elevation.

Ecology and conservation status.—*Clusia fabiolae* grows in rocky savannas below large rock walls. It is locally common, and is a conspicuous element of the vegetation. While its range is extremely restricted, most of it is protected and thus, *C. fabiolae* appears not to be threatened at this time.

Etymology.—It is a great pleasure to dedicate this species to my wife, Fabiola Monje-Pipoly (née Monje Silva), who, with the late Mario Mauriello, were instrumental in funding Venezuelan botanical projects while employed at Seguros Anauco, S. A., in Caracas. She has accompanied me in the field on numerous occasions and provides critical moral support, despite my frequent absences to pursue fieldwork.

The angulate branchlets, compound inflorescences, thin pedicels, cuneiform stigmas and cartilaginous leaves of *Clusia fabiolae* indicate a close relationship with *C. rotundifolia*. However, the thinner, decussately tetragonal, non-succulent branchlets, leaf blades with cordate bases and flat or subrevolute margins, shorter or obsolete peduncle and globose fruit immediately separate *Clusia fabiolae* from *C. rotundifolia*. The Tereké-Yurén populations of *Clusia fabiolae* are diminutive compared to those of Auyán-tepuí and the Chimantá-Massíf, but are qualitatively identical.

2. *Clusia phelpsiae* Lasser & Maguire, *Brittonia* 7:81. 1950. TYPE: VENEZUELA. AMAZONAS: Cerro Yaví, 1,850–2,200 m, 1–3 Mar 1947 (fr), *W. Phelps & C. Hitchcock* 69 (HOLOTYPE: NY!; ISOTYPE: VEN).

Small tree, to 3 m tall. Branchlets subtetragonal, semisucculent, deeply sulcate when dried, 5–7 mm diam., glabrous. Leaves subsessile; blades coriaceous, obovate, 5–9 cm long, 3–6 cm wide, apex broadly rounded, base subacute, midrib prominently raised above and below, secondary veins numerous, prominulous above and below, the submarginal vein inconspicuous, the margin thick, translucent, entire; petioles obsolete to 5 mm long, without adaxial margined pits. Inflorescence terminal, cymose, 3-flowered; peduncle obsolete to 1 cm long; floral bracts early caducous; pedicels obsolete to 5 mm long. Flowers yellow; sepals 4, decussate, coriaceous, widely ovate, 6–8 mm long, 4–6 mm wide, apex broadly rounded, medially carinate, the margin entire, opaque; petals 5, carnose, obovate-spathulate, 12–15 mm long, 6–8 mm wide, apex broadly rounded, the margin subentire; staminodia numerous, early caducous; pistil ovoid, the carpels 5; styles thick, 5 mm long; stigmas sessile, cuneiform, 2.5 mm long. Fruit urceolate, 2.5 cm long, 1.5 cm wide.

Distribution.—Known only from Cerro Yaví, state of Amazonas, Venezuela, at 1,850–2,200 m elevation.

Ecology and conservation status.—*Clusia phelpsiae* is a rare species, occurring only near the summit of Cerro Yaví. It is from one of the more inhabited areas of the Guayana in Amazonas, and therefore should be considered threatened.

PARATYPE examined: VENEZUELA. Amazonas: Cerro Yaví, 1,850–2,200 m, 1–3 Mar 1947 (pist. fl), W. Phelps & C. Hitchcock 69 (NY, VEN).

Clusia phelpsiae is similar to, and may be closely related to *C. rotundifolia*, but the broadly acute leaf bases, obsolete peduncle, higher floral merosity, early caducous staminodia, obsolete styles and larger, urceolate fruit, all allow easy recognition of the species. *Clusia phelpsiae* should not be confused with *C. phelpsiana* Maguire, of section *Clusiastrum*.

3. *Clusia rotundifolia* Gleason, Bull. Torrey Bot. Club 28:406. 1931. TYPE: VENEZUELA. AMAZONAS: Cerro Duida, Savanna Hills, 1,341 m; Aug 1928–Apr 1929 (stam. fl), G. Tate 798 (HOLOTYPE: NY!; ISOTYPE: F!).

Tree to 3 m tall. Branchlets tetragonal, the angles acute but not winged, 5–8 mm diam., semisucculent, deeply sulcate. Leaves subsessile; blades cartilaginous, suborbicular, to very broadly obovate, rarely oblong, 6–8(–9) cm long, (4–)6–8 cm wide, apex broadly rounded, truncate or rarely retuse above, base truncate, midrib slightly elevated above and below, the secondary veins numerous, the collecting vein 1–2 mm from margin, the margin revolute. Staminate inflorescence a compound cyme, each branch bearing 3 flowers; peduncle tetragonal, 3–4 cm long, deeply sulcate; secondary inflorescence bracts cartilaginous, oblate, 2–3 mm long, 4–6 mm wide, apex broadly rounded, prominently carinate, the margin opaque, not

scarios, entire; secondary inflorescence bracts cartilaginous, oblate, 1–2 mm long, 3–4 mm wide, apex broadly rounded, prominently carinate medially; pedicels 3–4.5 mm long; bracteoles 6, decussate, cartilaginous, the outer pair widely triangular, 1.5–2 mm long, 3–4.5 mm wide, apex subacute, the following pair stiffly coriaceous, suborbicular, 2.5–3.5 mm long and wide, apex broadly rounded, the margin thin but not scarios, entire; the innermost pair stiffly coriaceous, suborbicular to oblate, 3–4 mm long, 4–5 mm wide, apex broadly rounded, the margin scarios, entire. Staminate flowers whitish cream; sepals 4, cartilaginous, the outer pair opposite, suborbicular, 5–7 mm long and wide, apex broadly rounded, the margin hyaline, scarios, entire, the inner pair decussate, obovate, 6–8 mm long, 4–6 mm wide, apex broadly rounded, the margin scarios, irregularly notched; petals 4, decussate, carnose, obovate, 9–1.1 mm long, 5–6 mm wide, apex truncate, irregularly notched, somewhat cucullate, gradually narrowed to 3 mm wide basally; stamens numerous, 3–4.5 mm long, the androphore cubic, 1–1.2 mm diam., the filaments linear, fleshy, 1–1.5 mm long, the anthers linear, 1–1.5 mm long, the apex muticous, latrorsely dehiscent by wide longitudinal slits; pistillode absent. Pistillate inflorescence; as in staminate but peduncle (5–)25–45 mm long; primary bracts 10–12 mm long, 12–14 mm wide; secondary bracts 11–12 mm long, 12–13 mm wide; pedicels subobsolete to 8 mm long; floral bracts 6, as in staminate but the outer 1.3–1.5 mm long, 3.5–4 mm wide; the following pair 3–3.2 mm long and wide; the innermost pair 3–3.2 mm long, 4–4.2 mm wide. Pistillate flowers; sepals 4, as in the staminate but 7–7.3 mm long and wide, the inner ones 7.5–7.7 mm long, 6–6.2 mm wide; petals 4, obovate, 10–12 mm long, 6–6.5 mm wide, gradually tapering to 3 mm wide at base; staminodes 16, 3–3.5 mm long, the filaments basally fused to 0.3 mm, apically free 1.3–1.5 mm, the antherodes producing small amounts of pollen, ovate, 1.5–1.7 mm long, the apex obtuse, latrorsely dehiscent by wide longitudinal slits; pistil ovoid; carpels 4; stigmas cunieforn, sessile, the angles rounded, 1.3–1.5 mm long and wide. Fruit ovoid, 1.2–1.5 cm long, 2.3–2.5 cm wide.

Distribution.—Endemic to Cerro Duida, Cerro Parú, and Sierra Parima, the area between tributaries of the Río Ventuari and Río Orinoco, between the Río Paru to the north and the Río Padamo to the south, with a disjunct population on Sierra Parima, Amazonas, Venezuela, at 1,250–2,000 m.

Ecology and conservation status.—*Clusia rotundifolia* occurs at the margins of scrub forests with small savannas, on rather open, rocky areas. The population density and pressure to cultivate are extremely low in the area, so the species is not considered threatened.

Specimens examined: VENEZUELA. Amazonas: Depto. Atabapo, Plateau of Cerro Duida above Culebra, 03°36'N, 65°42'W, 1,250 m, 2 Mar 1985 (stam. fl), *R. Liesner*

18168 (MO, US, VEN); Cerro Duida, Río Cunucunuma, ridge W of Caño Culebra, 1,800 m, 22 Nov 1950 (fr), *B. Maguire et al.* 29658 (F, MO, NY, US, VEN); Cerro Duida, N escarpment, 1,600 m, 23 Nov 1950 (stam. fl), *B. Maguire et al.* 29659-A (MO, NY, VEN); Sierra Parima, headwaters of Río Matakuni, along the Venezuelan-Brazilian border, No. 7, 04°05'N, 64°24'W, 1,500 m, 19 May 1973 (fr), *J. Steyermark et al.* 107525 (BRIT, MO, NY, US, VEN); Serranía Parú, Río Parú, Caño Asisa, Río Ventuari, 12 km N along W rim, 2,000 m, 4 Feb 1951 (fr), *R. Cowan & J. Wurdack* M31259 (MO, NY, US, VEN); Depto. Atures, Serranía Parú, Central Plain, SW sector, 04°25'N, 65°32'W, 1,200–1,250 m, 5–7 Mar 1991 (fr), *P. Berry et al.* 4995 (MYF); Serranía del Parú (Aroko), 3rd central mesa, central-northern sector of the Serranía, 04°31'N, 65°35'W, 1,100 m, 3–4 Oct 1979 (stam. fl), *O. Huber* 4298 (MYF, NY, US, VEN); Serranía Parú, Río Parú, Caño Asisa, Río Ventuari, 6 km along W rim from Camp Caño, 2,000 m, 4 Feb 1951 (stam. fl), *R. Cowan & J. Wurdack* M31256 (F, NY, US, VEN).

Clusia rotundifolia is most closely related to *C. savannarum*, but is easily distinguished by the compound inflorescence, antherodes bearing pollen, albeit frequently abortive, sessile stigmas, ovoid fruit and montane tepui scrub forest habitat.

4. *Clusia savannarum* Maguire, Bull. Torrey Bot. Club 75:422. 1948.

TYPE: GUYANA. POTARO-SIPARUNI REGION: Kaieteur Savanna, 6 May 1944 (pist. fl, fr), *B. Maguire & D. Fanshawe* 2367 (HOLOTYPE: NY!; ISOTYPES: F!, FDG).

Tree to 3 m tall. Branchlets rounded quickly below, obtusely tetragonal near apex, 3.5–5 mm diam., glabrous. Leaves petiolate; blades cartilaginous, widely elliptic to suborbicular, (3–)4–8 (–9.5) cm long, (3–)5–7 cm wide, apex and base broadly rounded, nitid above, pallid below, midrib raised at bottom of adaxial groove, prominently raised below, secondary veins numerous, the collecting vein on the revolute margin; petioles subobsolete to 5 mm long, with broadly margined adaxial pits. Staminate inflorescence unknown. Pistillate inflorescence 1–3(–7)-flowered; peduncle tetragonal, not flattened, 8–12 mm long; primary inflorescence bracts opposite, stiffly coriaceous, suborbicular to elliptic, 3–10 mm long, 2–4 mm wide, apex subacute to obtuse, base obtuse to broadly rounded, the margin revolute; secondary bracts 2, opposite, carnos, suborbicular, 2.5–3 mm long, 1.5–2 mm wide, apex obtuse to subacute, sessile, medially prominently carinate, the margin scarious, flat, entire; pedicels 2–3 mm long. Flowers; sepals 4, decussate, stiffly chartaceous, widely ovate to suborbicular, 5–7 mm long and wide, apex broadly rounded, the margin scarious, with several notches; petals 4, rarely 5, the fifth one vestigial, contorted, carnos, obovate-spathulate, 7–10 mm long, apex truncate, irregular, tapering to 2.5–3.5 mm wide at base, white and often pink toward base; staminodia 10, 1.8–2.7 mm long, the filaments flat, 1–1.5 mm long, connate 0.2–0.3 mm into a tube, the apical free portion 0.8–1.2 mm long, the antherodes ovate, 1–1.5 mm long, apex subacute to obtuse, latrorsely dehiscent, containing small amounts of pollen; pistil ovoid, 3–5 mm long,

7–8 mm wide, carpels (4–)5, stigmas cuneiform, peltate, on short styles to 1.5 mm long. Fruit subglobose, yellowish green at maturity, 1–1.2 cm long, 1.3–1.5 cm diam.

Distribution.—*Clusia savannarum* is known only from the eastern portion of the state of Bolívar, Venezuela, and the Kaieteur Plateau of Guyana, at 460–1,000 m elevation.

Ecology and conservation status.—*Clusia savannarum* grows in the shrub islands in savannoid formations on white sands from sandstone below the tepuis. The shrub islands are characterized by the presence of *Cybianthus fulvopulverulentus* (Mez) Agostini (Myrsinaceae), *Clusia pusilla* Steyermark (Clusiaceae), *Emmotum* spp. (Icacinaceae), *Humiria balsamifera* St.-Hilaire (Humiriaceae), and *Licania* spp. (Chrysobalanaceae). The Kaieteur Plateau of Guyana lies in Kaieteur National Park, and is therefore protected, so this species cannot be considered threatened.

Specimens examined: VENEZUELA. Bolívar: Dtto. Roscio, slope N of Kamámeru, 05°25'N, 61°25'W, 1,000 m, 4 Mar 1983 (fr), *O. Huber et al.* 7303 (MYF, NY, VEN). GUYANA. Cuyuni-Mazaruni Region: Pakaraima Mts., Base camp on tributary of Partang River, 8.6 km NE of Imbaimadai, 05°46'N, 60°16'W, 650 m, 19 May 1992 (fr), *B. Hoffman et al.* 1681 (BRG, FDG, US). Potaro-Siparuni Region: Savanna near Kaieteur Falls, 460 m, 4 Mar 1962 (fr), *R. Cowan & T. Soderstrom* 2037 (FDG, NY, US).

Clusia savannarum is most closely related to *C. rotundifolia*, but may be recognized by its simple, 1-3-flowered inflorescence, the completely sterile antherodes, thin styles 1–1.5 mm long, and subglobose fruit. The shrub island habitat in the white sand savannas below the tepuis is quite different from the scrub forests on the tops which houses *C. rotundifolia*.

5. *Clusia wurdackiana* Pipoly, nom. nov.

Clusia sessilis Klotzsch ex Engler in Martius, *Flora Brasiliensis* 12(1):105. 1888, syn. nov. TYPE: VENEZUELA [GUYANA]: Roraima, Nov 1842 (stam. fl), *Rich. Schomburgk* 1037 (HOLOTYPE: B- destroyed; F Neg. 9200!), non *Clusia sessilis* G. Forster, *Fl. Ins. Austr.* 74. No. 391. 1786, = *Garcinia sessilis* (G. Foster) Seeman.

Clusia cerroana Steyermark, *Fieldiana, Bot.* 28:386. 1952. TYPE: VENEZUELA. BOLÍVAR: Ptari-tepuí, S-facing slopes between plateau portion and "Cave Camp," 1,700–1,800 m, 1 Nov 1944 (fr), *J. Steyermark* 59702 (HOLOTYPE: F!; ISOTYPE: VEN).

Shrub to small tree to 5(–15) m tall. Branchlets somewhat angulate, at times tetragonal but with obtuse angles, 8–10 mm diam., the bark transversely checked and exfoliating in the uppermost nodes. Leaves petiolate; blades chartaceous to coriaceous, obovate to widely oblanceolate, 9–24 cm long, 6–11 cm wide, apex broadly rounded to truncate or rarely, emarginate, base acute, midrib prominent above and below, the secondary veins numerous, prominulous above and below, the margins entire, flat; petioles canaliculate and marginate, 3–5 mm long, the adaxial margined pit as wide as the petiole. Staminate inflorescence a 6–9-flowered panicle of 3-flowered

cymes; peduncle 3–5 cm long; secondary inflorescence bracts coriaceous, suborbicular, 0.8–1.3 mm long and wide, apex broadly rounded, cucullate but not carinate, the margin scarious, entire; pedicels 1–1.5 mm long; bracteoles 4, decussate, the outer 2 stiffly coriaceous, oblate, 5–7 mm long, 6–8 mm wide, apex broadly rounded, medially carinate, the margin scarious, entire, the inner 2 chartaceous, obovate, 7–9 mm long, 4–6 mm wide, apex broadly rounded, the margin scarious, entire; Staminate flowers white; sepals 6, the outer 2 opposite, stiffly coriaceous, suborbicular, 5–7 mm long and wide, apex broadly rounded, medially carinate, the margin scarious, entire, the inner 4 contorted, increasingly larger, to 10 mm long and wide, cucullate but not medially carinate, the margin scarious, irregular, entire; petals 6, contorted, membranaceous, oblanceolate, 12–15 mm long, 5–7 mm wide, apex broadly rounded, cucullate, the margin opaque, not scarious, entire; stamens numerous, 15–20 mm long, the androphore cubic 6–9 mm diam., the filaments 9–11 mm long, the anthers linear, 5–7 mm long, apex muticous, the base truncate, latrorsely dehiscent by wide longitudinal slits; pistillode absent. Pistillate inflorescence a 3-flowered cyme; peduncle obsolete to 2(–5) cm long; secondary inflorescence bracts resembling leaves but narrowly oblanceolate to obovate, 4–8 cm long, 2–4 cm wide; bracteoles 2, cartilaginous, oblate, 4–6 mm long, 10–12 mm wide, apex broadly rounded, medially carinate, the margin scarious; pedicels obsolete to 1 cm long. Pistillate flowers like the saminate but sepals 4, decussate, suborbicular, 5–7 mm long and wide, apex broadly rounded, cucullate but not medially carinate, the margin scarious; petals unknown; staminodia obsolete; ovary subglobose, 5–7 mm long and wide; 5-carpellate; styles thick, radiate, 3–5 mm long at maturity; stigmas corniculoid, 5–7 mm long and wide, convex. Fruit subglobose, 1.5–2 cm long and wide, smooth, not sulcate.

Distribution.—Known from the Guayana Highland of Venezuela, Guyana, Surinam and adjacent Brazil, 330–2,000 m elevation.

Ecology and conservation status.—*Clusia wurdackiana* is a common element on rocky outcrops throughout its range. It frequently forms large colonies and reproduces rapidly from seeds as well as lammas shoots. It appears to be fire resistant, judging from populations observed in Brazil, which had distorted trunks from fire exposure. This is the most resilient species of the genus because it tolerates the greatest amount of ecological disturbance. Therefore, it is not considered threatened.

Etymology.—This species is dedicated to John Julius Wurdack, Curator of Botany Emeritus at the U. S. National Museum of Natural History, Smithsonian Institution. John is best known for his outstanding plant collections from the Guayana Highland of Venezuela and the Andean/Amazonian transitional region of Peru and for his pre-eminence as an authority on

the systematics and ecology of Neotropical Melastomataceae. His willingness to share his wealth of knowledge and to provide encouragement to younger systematists throughout the botanical community has had a profound effect on all of us who work in neotropical plant systematics.

Representative specimens examined: **VENEZUELA. Amazonas:** Cerro Aracamuni, summit, Proa Camp, 01°26'N, 65°47'W, 1,550 m, 16 Oct 1987 (fr), *R. Liesner & F. Delascio* 22021 (MO, US, VEN); 01°32'N, 65°49'W, 1,400 m, 26 Oct 1987 (fr), *R. Liesner & G. Carnevali* 22485 (MO, US, VEN); Cerro Aracamuni, N part, 01°32'N, 65°49'W, 1,415 m, 16–18 Oct 1987 (fr), *F. Delascio & R. Liesner* 13518 (MO, NY, US, VEN); N slopes of Cerro Duida, 2 km S of Culebra, 03°43'N, 65°45'W, 700 m, Apr 1990 (fr), *A. Fernández* 7757 (BRIT, PORT, VEN); on Plateau of Cerro Duida above Culebra, 03°36'N, 65°42'W, 1,250 m, 2 Mar 1985 (fr), *R. Liesner* 18151 (MO, US, VEN); Base of cliff on slope of Cerro Huachamacari, 03°39'N, 65°43'W, 1,000–1,300 m, 5 Mar 1985 (fr), *R. Liesner* 18312 (MO, US, VEN); Cerro Huachamacari, base of main wall and slope below it, E side, 03°49'N, 65°43'W, 800–1,300 m, 5 Nov 1988 (stam. fl), *R. Liesner* 25870 (BRIT, MO, US, VEN), (fr), *R. Liesner* 25876 (BRIT, MO, US, VEN); Cerro Huachamacari, Río Cunucunuma, 5 Dec 1950 (stam. fl), *B. Maguire et al.* 29854 (NY, US, VEN); vicinity of Summit Camp, Cerro Huachamacari, 1,800 m, 6 Dec 1950 (stam. fl), *B. Maguire et al.* 30016 (MO, NY, US, VEN), 1,600 m, 15 Dec 1950 (stam. fl bud), *B. Maguire et al.* 30254 (NY, US, VEN), 1,620 m, 15 Dec 1950 (fr), *B. Maguire et al.* 30255 (NY, US, VEN); Slope of Cerro Marahuaca, above Río Yameduaka, 03K 38'N, 65K 28'W, 1,225 m, 19 Feb 1985 (fr), *R. Liesner* 17692 (MO, US, VEN); Cerro de la Neblina, S face of Pico Phelps Massif, 00°48'N, 66°00'W, 1,550–1,650 m, 13 Apr 1984 (fr), *A. Gentry & B. Stein* 46600 (MO, NY, US, VEN); Cerro de la Neblina, 6.5 km SSW of base camp, S extension of range, 00°47'N, 66°11'W, 1,600 m, 18 Apr 1984 (fr), *B. Stein et al.* 1652 (BRIT, F, MO, NY, US, VEN); Vicinity of Camp VI, Cerro Neblina, on ridge on Venezuelan-Brazilian border, 3.5 km W of Pico Zuloaga, 00°53'N, 65°56'W, 2,000 m, 13–15 Apr 1984 (fr), *W. Thomas & T. Plowman* 3059 (BRIT, F, MO, NY, US, VEN); Above Camp III, Cerro de la Neblina, Río Yatua, 1,600–1,700 m, 17 Nov 1957 (stam. fl), *B. Maguire et al.* 42044 (NY, US, VEN); Above Camp IV, Cerro de la Neblina, 1,650–1,700 m, 12 Nov 1957 (stam. fl), *B. Maguire et al.* 42056 (NY, US, VEN); Caño Grande, Cerro de la Neblina, E of Cumbre Camp, 1,100–1,300 m, 25 Nov 1957 (fr), *B. Maguire et al.* 42228 (NY, US, VEN); Cerro de la Neblina, along W escarpment, 1,900–2,00 m, 6 Jan 1954 (fr), *B. Maguire et al.* 37076 (NY, US, VEN); Cerro Sipapo (Paráque), below Camp Grande Terrace, 1,400 m, 15 Dec 1948 (fr), *B. Maguire & L. Politi* 27686 (NY, US, VEN); Cerro Sipapo, S terraces of Peak IV, 1,800 m, 3 Jan 1949 (fr), *B. Maguire & L. Politi* 28133 (NY, US, VEN); In Caño Profundo, Cerro Sipapo, 10 Jan 1949 (fr), *B. Maguire & L. Politi* 28628 (NY, US, VEN); Serranía de Tapirapécó, Campo Tamacuari, stream trail from camp, 01°14'N, 64°40'W, 1,300 m, 10 Feb 1989 (fr), *H. Beck et al.* 939 (BRIT, NY, VEN), (fr), *A. Henderson* 1025 (BRIT, NY, VEN); On plateau N of unnamed 1,760 m peak, 9 km NW of settlement of Yutajé, 4 km W of Río Coro-Coro, W of Serranía de Yutajé, 05°41'N, 66°10'W, 1,050–1,300 m, 7 Mar 1987 (fr), *R. Liesner & B. Holst* 21732 (MO, US, VEN); 5–8 km NW of Yutajé, S slope below Serranía de Yutajé, 3 km W of Río Coro-Coro, W of Serranía, 05°40'N, 66°09'W, 700–1,000 m, 10 Mar 1987 (fr), *R. Liesner & B. Holst* 21841 (MO, NY, US, VEN); Cumbre of Cerro Yutajé, E sector of Serranía de Yutajé, headwaters of Caño Yutajé, 05°45'N, 66°03'W, 1,800 m, 21 Mar 1988 (fr), *O. Huber* 12618 (MYF, NY, US, VEN); SE summit of Serranía Yutajé, Río Maniapiare, 2,100 m, 17–19 Feb 1953 (fr), *B & C. Maguire* 35343 (NY, US, VEN). **Bolívar:** Auyán-tepuí, summit, in S-central region, headwaters of Río Churún, 05°51'N, 62°32'W, 1,700 m, 29 Mar 1987 (fr), *B. Holst* 3730 (MO, US,

VEN); SE of second wall, near Río Churún, near S camp, 1,690 m, S section, W division of Auyán-tepuí, 3 May 1964 (fr), *J. Steyermark* 93319 (F, MO, NY, US, VEN); Río Lomita Camp, summit of SE portion of NW arm, W division of Auyán-tepuí, near "Río Lomita Camp", 1,800 m, 10 May 1964 (fr), *J. Steyermark* 93569 (MO, NY, US, VEN); Chimantá Massif, Central Section, NNW of Summit Camp, 1,970 m, 19 Feb 1955 (fr), *J. Steyermark & J. Wurdack* 941 (F, MO, NY, US, VEN); Alto Río Cuyuni, above escarpment of La Escalera, 850 m, 20–21 Aug 1962 (fr), *B. Maguire et al.* 46834 (NY, US, VEN); Cerro Guaiquinima, Río Paragua, below rim of W Escarpment, 1,600–1,700 m, 31 Dec 1951 (fr), *B. Maguire* 32893 (NY, US, VEN); Ilu-tepuí, Gran Sabana, 1,500 m, 8 Mar 1952 (fr), *B. Maguire* 33315 (NY, US, VEN); Sierra de Lema, headwaters of Río Chicanán, at base of NE-facing bluffs, 80 km SW of El Dorado, 06°05'N, 62°00'W, 500 m, 28 Aug 1961 (fr), *J. Steyermark* 89550 (F, MO, NY, US, VEN); Mpio. Cedeño, Serranía de Maigualida, sandstone mountains 20 km E of San José de Kayamá, 45 km N of Cerro Impacto, 06°19'N, 65°12'W, 1,250 m, Apr 1969 (fr), *A. Fernández* 5397 (BRIT, PORT, VEN); Cerro Impacto, 06°00'N, 65°10'W, 1,250 m, Jun 1988 (fr), *S. Elcoro* 348 (BRIT, PORT, VEN); Trirepón-tepuí, SW side of Río Asaporpo, 1,300 m, 7 Jan 1953 (fr), *J. Wurdack* M34040 (F, NY, US, VEN); Cerro Venamo, along right bank of W slope near Guyana border, 950–1,150 m, 29–30 Dec 1963 (fr), *J. Steyermark et al.* 92363 (F, MO, NY, US, VEN). **BRAZIL.** Amazonas: Mpio. de Barcelos, Platô da Serra Aracá, Serra Norte, 6 hours W of well camp, 00°51'N, 63°22'W, 1,150 m, 20 Feb 1984 (fr), *I. do Amaral, J. Pipoly et al.* 1635 (INPA, K, MG, NY); Pico Rondôn, 0–3 km N of km 211 of Perimetral Norte Hwy, Pico Rondôn, 01°32'N, 62°48'W, 3 Feb 1984 (fr), *J. Pipoly et al.* 6617 (INPA, K, MG, NY, US). **GUYANA.** Cuyuni-Mazaruni Region: Mt. Ayanganna, E-most peak, 05°25'N, 59°57'W, 1,350–1,380 m, 11 Mar 1987 (fr), *J. Pipoly et al.* 11113 (B, CAY, FDG, NY, P, U, US). Potaro-Siparuni Region: Kaieteur Plateau, Kaieteur Falls, along W rim of Potaro Gorge, 330 m, 18 Feb 1962 (fr), *R. Cowan & T. Soderstrom* 1896 (BRG, K, US); Kaieteur Falls, 05°12'N, 59°29'W, 500 m, 2 Apr 1988 (fr), *W. Hahn et al.* 4113 (BRG, NY, US); Mahdia River Valley, tributary of Potaro River, E-facing escarpment of Mt. Ebini, 700 m, 15 Oct 1951 (fr), *B. Maguire* 32123 (FDG, NY, US); Pakaraima Mts., Mt. Kukuinang, adjacent W edge of Kukuinang Savanna, 05°04'N, 59°57'W, 900–1,000 m, 26 Feb 1993 (fr), *T. Henkel et al.* 1574 (BRG, BRIT, US); Mt. Wokomung, summit ridge of Kamiewah Pinnacle NE to S Pinnacle, "Little Ayanganna", 05°04'N, 59°52'W, 1,550–1,650 m, 17 Nov 1993 (fr), *T. Henkel et al.* 4459 (BRG, US). Surinam: Wihelmina Gebergte, upper slopes and summit of Juliana Top, 15 km N of Lucie River, 1,000–1,230 m, 18 Aug 1963 (stam. fl), *H. S. Irwin et al.* 54862 (BBS, NY, U, US).

The thick branchlets and pedicels and corniculoid stigmas of *Clusia wurdackiana* indicate that it is closely related to *C. pachyphylla*. However, the chartaceous to coriaceous, obovate to oblanceolate leaf blades, with acute bases and flat margins, stiffly coriaceous sepals with entire margins, thick, radiate styles and smooth ovary and fruit clearly distinguish *Clusia wurdackiana* from *C. pachyphylla*. *Clusia wurdackiana* is a polymorphic ochlospecies (*sensu* Prance 1982; White 1962; Pipoly 1983), with great quantitative variation across a broad geographic range.

Steyermark (1981) corrected the common misconception that Schomburgk's Roraima collections took place on the Guyanese side of the mountain, when in fact, he approached the upper slopes from the Venezuelan side, hence the correction in the type citation.

6. *Clusia pachyphylla* Gleason, Bull. Torrey Bot. Club 58:405. 1931. TYPE: VENEZUELA. AMAZONAS: Cerro Duida, summit of Peak 7, 2,230 m, Aug 1928–Apr 1929 (pist. fl), *G. Tate* 609 (HOLOTYPE: NY!).

Clusia scariosa Lasser & Maguire, Brittonia 7:81. 1950. syn. nov. TYPE: VENEZUELA. AMAZONAS: Cerro Yaví, 2,200 m, 1–3 Mar 1947 (fr), *Phelps & C. Hitchcock* 51 (HOLOTYPE: NY!; ISOTYPE: VEN).

Free-standing tree to 6 m tall; branchlets tetragonal, 8–11 mm diam., strongly sulcate, glabrous. Leaves petiolate; blades thickly cartilaginous, elliptic to obovate, (5–)8–10(–18) cm long, (2.5–)6.5–10 cm wide, apex broadly rounded to broadly obtuse, midrib slightly raised above, prominently raised below, decurrent to petiole base, secondary veins numerous, prominently raised above and below, the collecting vein on the revolute margin; petioles trigonal, sub- to strongly marginate, 1–1.5(–2) cm long, the adaxial pit deep, strongly margined, less than petiole diameter. Staminate inflorescence 1–3-flowered; peduncle 1–1.5 cm long; tetragonal, deeply sulcate; floral bracts 4, decussate, suborbicular, cartilaginous, 0.8–1.2 cm long and wide, apex obtuse, prominently carinate, the margin scarious, opaque, irregularly notched; pedicels obsolete to 3 mm long. Staminate flowers; sepals 8–10, the outer four decussate, cartilaginous, suborbicular, 8–15 mm long, 10–16 mm wide, apex broadly rounded, the margin whitish scarious, variously incised, the inner ones as in the outer but contorted, acropetally larger, obovate to reniform, 15–20 mm long, 18–23 mm wide; petals 6–8, the outer two decussate, the inner ones contorted, all similar in shape and size, coriaceous to carnose, obovate, 2.5–3 cm long, 1.3–2 cm wide, apex deeply erose, stamens numerous, 5–7 mm long, the androphore cubic, 1.5–2 mm long, the filaments linear, thick, 2–3 mm long, the anthers linear, 3–4 mm long, extrorsely dehiscent by wide longitudinal slits, the connective muticous; pistillode absent. Pistillate inflorescence as in staminate but peduncle 1.5–2 cm long; bracts as in staminate; pedicels obsolete to 5 mm long. Pistillate flowers as in staminate but sepals 8–15 mm long 11–18 mm wide; petals but 2.0–2.5 cm long, 1.2–1.6 cm wide, persistent in fruit; staminodia numerous, as in staminate but not on androphore, 5–6 mm long, the filaments 3–3.5 mm long, irregularly grouped in phalanges, the antherodes 1–1.5 mm long, some of them producing pollen; pistil ovoid, 5–8 mm long; carpels 6–8, the stigmas sessile, convex, corniculoid, the corners acute, 4–5 mm long, 3–5 mm wide. Fruit subglobose, 2.3–2.8 cm long, 3.3–4 cm diam.

Distribution.—Endemic to the NW portion of the state of Bolívar, westward through southern Amazonas, Venezuela, at 1,700–2,200 m.

Ecology and conservation status.—*Clusia pachyphylla* is infrequent on rocks in savannas on the summits of the tepuis it inhabits. The areas in which it occurs are quite remote and therefore, this species is not considered threatened.

Specimens examined: **VENEZUELA. Amazonas:** Summit of Cerro Coro-Coro, NW headwaters of Río Maniapiare, (NW sector of Serranía Yutajé), 05°46'N, 66°12'W, 2,200 m, 12 Nov 1987 (fr), *O. Huber* 12310 (MYF, NY, VEN); Summit of Cerro Duida, 1,800–2,075 m, 4 Sep 1944 (fr), *J. Steyermark* 58344 (F, VEN); Depto. Atures, Sierra Maigualida, NW sector, small valley along an upper tributary of Caño Iguana, 05°30'N, 65°15'W, 2,000 m, 28 Feb–3 Mar 1991 (fr), *P. Berry et al.* 4862 (BRIT, MO, VEN), (fr), 4883 (BRIT, MO, VEN), (stam. fl), 4885 (BRIT, MO, VEN), 2 Mar 1991 (fr), *O. Huber et al.* 13103 (BRIT, MO, VEN); Serranía Uasadi, NW sector, summits at E headwaters of Río Asita, right tributary of Río Ventuari, 05°21'N, 65°12'W, 1,850 m, 22 Nov 1988 (fr), *O. Huber* 12850 (MYF, US, VEN); Cerro Yaví, 2,200 m, 1–3 Mar 1947 (fr), *K. Phelps & C. Hitchcock* 53 (NY, VEN); Summit of Cerro Yaví, headwaters of Río Parucito, W tributary of Río Maniapiare, in the NE sector of summit, 05°43'N, 65°52'W, 2,100 m, 29 Oct 1986 (stam. fl), *O. Huber* 11880, (MYF, NY, VEN), (pist. fl, fr), *O. Huber* 11868 (MYF, NY, VEN); Summit of Cerro Yutajé, E sector of Serranía Yutajé, headwaters of Caño Yutajé, 05°45'N, 66°03'W, 1,800 m, 21 Mar 1988 (fr), *O. Huber* 12622 (MYF, NY, US, VEN). **Bolívar:** Auyán-tepuí, Sep 1937 (fr), *F. Cardona* 232 (F, NY, US, VEN); Cerro Guaiquinima, Río Paragua, N Valley, 1,700 m, 2 Jan 1952 (fr), *B. Maguire* 32926 (F, MO, NY, US, VEN); Summit, Cerro Guaiquinima, 1 km NW of Cumbre Camp, 26 Dec 1951 (fr), *B. Maguire* 32788 (F, NY, US, VEN); Meseta de Jaua, Central-Southern sector, southern plateau, headwaters of Río Marango, headwaters of Río Cácaro, 04°48'N, 64°32'W, 1,750–1,800 m, 20 Nov 1989 (stam. fl), *O. Huber* 13020 (BRIT, MYF, VEN); Dtto. Cedeño, Sierra de Maigualida, NE sector, plateau on the headwaters of the Río Chajura, W tributary of the Río Erebató, ca. 100 km SW of Campamento Entreríos, 05°33'N, 65°13'W, 2,100 m, 28 Mar 1988 (stam. fl), *O. Huber* 12728 (MO, MYF, US, VEN); Sierra de Maigualida, NE sector, headwaters of Río Chajura, W tributary of Río Erabato, 100 km SW of Campamento Entreríos, 05°33'N, 65°13'W, 2,100 m, 18 Nov 1988 (fr), *O. Huber & L. Izquierdo* 12789 (MYF, NY, US, VEN).

The thick branchlets and pedicels, and corniculoid stigmas of *Clusia pachyphylla* indicate a close relationship to *C. wurdackiana*. However, the cartilaginous, elliptic to suborbicular leaf blades, with obtuse to truncate bases, chartaceous sepals with incised margins, the obsolete styles, and deeply sulcate fruit clearly distinguish *C. pachyphylla*. This species is one of a very few with prominent secondary venation despite the cartilaginous texture of the leaf blades.

The type of *Clusia scariosa* Maguire differs only in the smaller, more closely veined leaves, larger petals and more numerous staminodia, all quantitative characters which have now been found to vary widely based on analysis of many more gatherings than were available to Maguire. One collection from Sierra Magualida (*P. Berry et al.* 4883) has fruits with much narrower stigmas whose margins are fimbriate, and may represent an undescribed taxon. More collections from the Sierra and environs will be necessary to fully understand variation in *Clusia pachyphylla*.

7. ***Clusia duartei*** Maguire, *Moscoso* 4:215. 1986. TYPE: VENEZUELA. AMAZONAS: Cerro Sipapo, Campo Grande, 1,500 m, 10 Dec 1948 (stam. fl), *B. Maguire & L. Politi* 27575 (HOLOTYPE: NY!; ISOTYPES: F!, G, JBSD, K!; MO!; US!, VEN).

Tree to 10 m tall; branchlets tetragonal, the angles acute but not alate, 15–22 mm diam., semisucculent, not sulcate. Leaves petiolate; blades cartilaginous, suborbicular to very widely elliptic, 20–27 cm long, 19–21.5 cm wide, apex very broadly rounded to subtruncate, base very broadly rounded, midrib slightly raised above ca. $\frac{3}{4}$ its length, decurrent to petiole base, prominently raised below, secondary veins numerous, inconspicuous above, barely visible below, the submarginal collecting vein ca. 2 mm from margin, the margin flat; petioles trigonal, somewhat marginate, 2–3 cm long, the adaxial pits strongly marginate. Staminate inflorescence 1–3-flowered; peduncle tetragonal, the angles acute, 2 cm long; primary inflorescence bracts foliaceous, opposite, cartilaginous, suborbicular, petiolate, the blades 4.5–7.5 cm long, 3.5–6.5 cm wide, apex truncate, base obtuse, the midrib and secondary veins as in leaves, the petioles ca. 1 cm long, the adaxial pit strongly marginate; bracteoles 2, carnose, suborbicular, 1–1.5 cm long and wide, apex broadly rounded, prominently carinate, the margin narrowly scarious, subentire, with occasional incisions; pedicel 3–10 mm long. Staminate flowers; sepals 8–10, decussate, the outer stiffly chartaceous, oblate, 1.2–1.5 cm long, 2–2.5 cm wide, apex broadly rounded, the margin very narrowly scarious, entire but undulate when dried, the inner acropetally thinner, more orbicular and larger, 2–2.5 cm long and wide, the scarious margin progressively wider; petals 8–10, contorted, coriaceous, oblong, contorted, 4.5–5 cm long, 1.5–2 cm wide, not gradually tapering toward base, apex very broadly rounded to truncate, the margin scarious, opaque, entire; stamens numerous, 1.5–2 cm long, the androphore cubic, 8–10 mm long, the filaments united basally, linear but fleshy, 3–5 mm long, the anthers linear, 3–5 mm long, apex muticous, dehiscent by introrse, wide longitudinal slits; pistillode absent. Pistillate inflorescence unknown, except floral bracts 2, cartilaginous, suborbicular, 1.2–1.5 cm long and wide, the apex broadly rounded, prominently keeled, the margin opaque, somewhat scarious; pedicels obsolete to 4 mm long. Pistillate flowers (from mature fruit); sepals 8, persistent in fruit, as in staminate but 1.5–1.8 cm long, 2–2.5 cm wide, apex broadly rounded, the margin widely scarious, irregularly incised, acropetally larger and more suborbicular to 2.5 cm long, 2.3 cm wide; petals 6, very widely oblong to suborbicular, 2.5–3 cm long and wide; staminodes 12–16, 6–10 mm long, barely connate by filaments basally, the filaments 3–5 mm long, the anthers ovate, 5–7 mm long, apex obtuse, latrorsely dehiscent by a long longitudinal slit, devoid of pollen or producing small amounts of deformed pollen; pistil unknown; carpels 10–12, deeply sulcate along the sutures, the stigmas sessile, subapical, corniculoid, the angles rounded, 4–5 mm long, 3–4 mm wide. Fruit subglobose, 5–6 cm long, 6–8 cm wide.

Distribution.—Endemic to the western portion of the state of Amazonas of Venezuela, known from Cerros Sipapo and Cuao, at 1,500–1,580 m.

Ecology and conservation status.—*Clusia duartei* occurs in low scrub forest along river margins. It is known from only four collections, and should be considered rare, but not enough is known of its population biology to determine if it is threatened.

Specimens examined: VENEZUELA. Amazonas: Depto. Atures, Cerro Cuao, Caño Cabeza de Manteco, 73 km SE of Puerto Ayacucho, 05°06'N, 67K 24'W, 1,580 m, Sep 1989 (fr), A. Fernández *et al.* 6271 (MO, PORT, VEN); Cerro Sipapo, Campo Grande, 1,500 m, 10 Dec 1948 (stam. fl), B. Maguire & L. Politi 27543, (fr), 28683 (NY, VEN).

Clusia duartei appears to be most closely related to *C. pachyphylla*, but can immediately be distinguished by its thicker branchlets, longer petioles, massive leaf blades and fewer, longer floral bracts. cursory comparison of vegetative parts may result in initial confusion with some individuals from populations of *C.* (sect. *Clusiastrum*) *crassifolia* Planchon & Triana, but the yellow latex, minute stigmas on thin, finger-like styles, and antheriferous staminodes with dehiscence *via* subterminal pores (characteristics of all members of sect. *Clusiastrum*) clearly differentiate *C. crassifolia*.

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